The Interdependence of Macroeconomic and Industrial Policy

Policy Study Series

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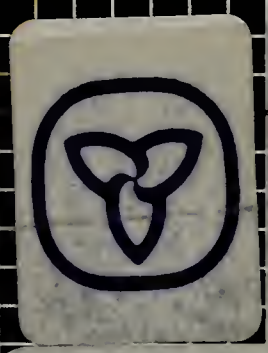
William J. Milne



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Ontario Economic Council

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Contents

Preface

This is the fourth in a series of studies on industrial policy prepared for the Ontario Economic Council under the auspices of the Institute for Policy Analysis of the University of Toronto by a group of researchers at the University of Toronto and McGill University headed by Richard M. Bird and Christopher Green. Three studies – William G. Watson's *A Primer on the Economics of Industrial Policy*, Ronald S. Saunders's *Aid to Workers in Declining Industries*, and Christopher Green's *Industrial Policy: The Fixities Hypothesis* – have already been published in the Council's Policy Study Series. A further study – Yehuda Kotowitz's *Positive Industrial Policy: The Implications for R&D* – will be published shortly, as well as a summary overview of the project as a whole by Richard Bird. Although each author in this series has generally pursued his own line of investigation in his own way, as a whole this collection of studies on different aspects of industrial policy provides a thorough (and in general rather skeptical) review both of much of the burgeoning literature on this subject and of many relevant federal and provincial policies that are now in place or have been proposed.

May 1985

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Director
Institute for Policy Analysis
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1
Introduction

Industrial policy has played an important role in shaping the Canadian economy in the past and will undoubtedly continue to be important through the 1980s. In broad terms, industrial policy may be viewed as government policy that is intended to alter, in some way, the industrial structure of the economy. This very general definition encompasses policies ranging from those designed to stimulate aggregate savings and investment (in recent times called supply-side economics) to such industry-specific policies as 'picking the winners' and adjustment assistance – that is, the provision of incentives or financial support to very narrowly defined sectors. Between these extremes lie a wide variety of government policies that offer financial assistance to business and affect the industrial structure of Canada. Such policies have been intended not only to stimulate overall economic growth and productivity but also, at various times, to achieve such diverse (and sometimes conflicting) goals as regional economic development, a reduced level of foreign ownership, improved international competitiveness, and the preservation of particular jobs.

The call for a new industrial policy came in many forms in the 1970s. Some observers argued for lower tariffs to help improve the efficiency of the Canadian manufacturing sector by allowing it to specialize in products that could compete in world markets (Daly and Globerman 1979, Williams 1976, Economic Council of Canada 1975). Others argued for major direct government intervention in the economy. For example, the Science Council of Canada (1971) proposed a strategy of aid to medium- and high-technology manufacturing in fields related to resource production, arguing that over a five- to ten-year period such assistance would result in substantial employment benefits. Britton and Gilmour (1978) argued that the Canadian manufacturing sector is too small to compete effectively in world markets, and that consequently

areas such as high technology need government support. More recently, Steed (1982) has argued for the promotion of Canada's threshold firms through a policy of backing the winners.

Quite apart from policies that provide assistance to business directly, general macroeconomic policies – fiscal and monetary – may have important industrial effects. These policies are often overlooked in the discussion of industrial policy, even though their effects on particular sectors of the economy may at times be greater than the effects of industrial policies as such. Indeed, both industrial and macroeconomic policies have impacts on both the demand side and the supply side of the economy and may produce feedback between them. We should not, therefore, analyse such policies in isolation, considering only their effects on certain industries (or ignoring those effects). In particular, since much of the impetus behind the development of industrial policy probably arises from macroeconomic concerns in the first place, it seems especially appropriate to analyse the effects of industrial policies in the framework of a macroeconomic system. The principal purpose of the present paper is therefore precisely to evaluate a variety of such policies in terms of their effects on overall macroeconomic performance, industrial structure, and regional development within a broader, general equilibrium framework.

Chapter 2 briefly discusses the various types of policies that have an impact on the industrial structure of Canada. Chapter 3 describes the methodology followed in order to assess the impact of selected industrial policies on the Canadian economy. Chapter 4 describes this impact as seen in simulations that use the econometric models housed at the Institute for Policy Analysis at the University of Toronto (the FOCUS and PRISM models). Chapter 5 summarizes the findings and derives a number of conclusions from them.

2
Varieties of industrial policy

Other studies have described in detail the many forms of industrial assistance available in the Canadian economy (see, for example, Davenport et al. 1982, Tupper 1982, and Milne 1983). The purpose of this chapter is simply to provide a brief introduction to the varieties of 'industrial policy', broadly defined, that are analysed in Chapter 4 in a macroeconomic context.

Since much of the recent pressure to develop an industrial strategy has undoubtedly been the result of macroeconomic concerns, the policies employed should, ideally, have effects that will ease the macroeconomic problems encountered over the past decade. These problems include slow economic growth, a marked slowdown in productivity growth, inflation, balance of payments problems, low levels of research and development expenditure, investment and foreign ownership concerns, and many microeconomic sectoral and regional concerns. Of course, some of these problems may be resolved through the usual macroeconomic tools of fiscal and monetary policy, but even these broad macroeconomic policies may have significant sectoral or industrial impacts.

The policies considered in this paper fall into four classes:

1 general macroeconomic policies/conditions,
2 general structural policies/conditions,
3 general industrial policies, and
4 specific industrial policies.

General macroeconomic policies, though not often regarded as industrial policies, may have important industrial or sectoral effects. Consider, for example, a restrictive monetary policy that diverts funds from investment. As is well known, such a restrictive policy may do substantial damage to both residential construction and durable

manufacturing. Governments often intervene in response to sectoral problems that result from macroeconomic policies or general economic conditions. For example, during the recent recession in Canada, the housing sector received aid through a government grant program to first-time home buyers. Industrial policies in such cases are intended to offset to some extent the harmful sectoral effects of macroeconomic policies. However, as Schwartz and Choate indicate, there is frequently a need for more co-ordination between macroeconomic and microeconomic policies. They suggest that

> The interaction between macro policies and more specific or micro policies is the key to the problems we now face. Micro interventions ... can fail or flourish according to the degree that they work with or against macro policy. (1980, 67)

Another example of a general macroeconomic policy is exchange-rate policy. Shepherd notes that both the Japanese and the Germans have followed an exchange-rate policy designed to accommodate their trading strategy, while in the Canadian case 'the policy error of maintaining an artificially high dollar has been compounded by the high interest rates which the policy necessitated' (1980, 11).

Structural policies and conditions may also have significant industrial effects. For example, some observers claim that the sharp rise in energy prices since 1974, by causing manufacturing costs to rise sharply as well, has significantly slowed growth in Ontario. However, as industry adjusts to the higher prices by installing energy-efficient equipment, there may be overall productivity improvements. Marketing boards (and other regulatory agencies) provide another example of a structural policy or condition that affects industry, since they regulate the flow and price of certain goods. Structural conditions also include nontariff barriers to trade which, by impeding the free movement of goods and services, can cause resource misallocation.[1]

Policies directed explicitly to the industrial sector may be classified as either general or specific. General industrial policies apply across all sectors of the economy, while a specific industrial policy is directed at a particular industry. Industrial policy is primarily intended to affect the supply side of the economy, and the debate continues as to whether general or specific policies are more effective in stimulating supply.[2] Important issues here are whether the supply response is great enough to boost productivity growth and how long the waiting period is before the response is realized.

As Adams (1983) indicates, the impetus behind the development of a

general industrial policy comes from several sources. Some analysts argue that once the decision is taken to follow a stimulative industrial policy the market mechanism should determine which industries benefit from the stimulus. If the stimulus is directed at particular industries, it may lead to a misallocation of resources and consequently not be optimal. Government agencies are not likely to be able to determine which specific industries will succeed in the future. Consequently, a general industrial policy may be preferable. However, even a 'general' industrial policy is not likely to be neutral in either its industrial or its regional impact. Consider, for example, an investment tax credit on machinery and equipment. Industries that are capital-intensive will gain relatively more from such a credit. The policy may change the industrial structure of the nation if productivity improves from increased investment in these industries, resulting in lower costs or more output. To the degree that capital-intensive industries are located in certain provinces, this general policy may affect regional development patterns as well.

Several different types of industry-specific policies may be identified: (i) picking winners, (ii) aiding losers, (iii) transitional or adjustment aid, (iv) aid to develop infrastructure (e.g., transportation facilities), and (v) science policy.

In Canada, moreover, regional economic development and industrial policy are closely linked. Thus the federal government provides considerable aid to lagging regions. Many economists have objected to such measures as the Regional Development Incentives Act (RDIA) and the General Development Agreements. Usher (1975), for example, suggests that the federal policies exhibit the following shortcomings:

- a bias towards corporate expenditure on capital
- a tendency to displace investments which in the absence of the Department of Regional and Economic Expansion (DREE) would have been undertaken.

The provinces, especially recently, have been following somewhat similar 'province-building' strategies by trying to foster the development of industry. Indeed, most provincial governments are openly trying to make their provinces more attractive to industry.

The goals of regional and industrial policy may not coincide. The main thrust of regional policy has been to respond to disparities in income across regions. But helping lagging regions need not meet the goals of industrial policy, while following an industrial strategy may not aid in dealing with regional concerns. Garn and Ledebur point out two questions that emerge in considering regional versus industrial policy:

1 Would it be desirable to have regional policy coordinated with industrial policy so that each reflects the primary aims of the other and works in concert to promote national and regional efficiency?

2 Does pursuit of either kind of policy imply significant trade-offs relative to the aims of the other, or can these policies be complementary? (1982, p. 48)

As Klein (1983) has indicated, there may be substantial benefits for the nation as a whole if the provinces follow a co-ordinated policy. Such a policy would be designed to strive for an outcome across provinces that addressed more consistently the concerns that have prompted the current discussion about an industrial strategy in Canada. If each province pursues an industrial development program independently, we can perhaps expect the usual result of the erection of nontariff barriers to trade and an overall lower growth rate for the nation as a whole.

3
The modelling of industrial policy

In order to assess the impact on the national and provincial economies of industrial policy, we must capture the interaction between the demand side and the supply side of the economy. There can be little argument that an industrial policy (whether general or specific) will result in feedbacks to the demand side, even if the policy is directed primarily to the supply side. By the same token, macroeconomic or structural policies may have not only direct demand-side impacts, but also important supply-side effects, especially over the longer run. Hence, a general equilibrium approach is needed to examine the overall impact of these policies.

Economic models can, of course, only approximate the complexities of the actual workings of the economy. This study assesses certain economic impacts of a variety of industrial policies and structural changes in industry in an effort to determine the effects of these policies on real growth and inflation in the economy. The use of an econometric model makes it possible to evaluate the impact of these policies on economic performance while maintaining consistency across various sectors, given the specifications of the model.

There are at least two important questions here. First, what is the effect of a given policy on the level of output of goods and services? For example, how much higher (or lower) is real GNP or employment on average as a result of the change? Second, how will the policy affect the growth rate of output or employment over longer periods of time? For example, an investment tax credit may increase the growth rate of output because it increases the potential growth of the economy (through its effect on productive capacity).

It is often suggested that industrial policy that is intended to change structure should be considered in the medium to long term, since adjustment takes time. It is the increase in potential output or the

growth rate of potential output in the long run that is important, a consideration that raises the issue of the short-run costs of implementing the policy versus the long-run payoff. Unfortunately, most constructed models of the economy are not able to deal effectively with policies designed to alter the potential growth path. In particular, a policy shock will exhibit a damped cycle that eventually converges with the underlying base or control solution growth path. However, the model used in this study does, under certain macroeconomic regimes, allow for some impact on long-run growth.

Of course, the structure of the model used constrains the type of results that can be examined. For example, the level of disaggregation constrains the specificity of the policies that may be considered, while the nature of the linkages between the sectors and the economic transmission mechanisms in the model may alter the results significantly. The balance of this chapter describes the models used here to evaluate certain policies that affect industrial structure. The next section presents an overview of the econometric system used. This overview is followed by a description of the control solution for the national and provincial economies against which the impacts of different policies are measured.

AN OVERVIEW OF THE ECONOMIC MODEL[3]

The FOCUS/PRISM system of macroeconometric models of the Policy and Economic Analysis Program at the Institute for Policy Analysis of the University of Toronto has been used to perform, and to assess the effects of, the various simulations described in the next chapter.

The first part of this system, FOCUS, is a quarterly, national macroeconometric model that includes elements of both the demand side and the supply side of the economy. Since the model is used over a fairly long time horizon, it incorporates supply-side features leading to potential economic growth. It is important to note, however, that the model projects short-run likely growth paths, and that over the longer run the economy is assumed to move towards full employment, in part because it would be unreasonable to assume anything else in a control solution. Since FOCUS includes both a supply side and considerable detail on the demand side, the interaction of demand-side and supply-side variables may be examined, at least in part.

FOCUS includes the aggregate expenditure categories of consumption, investment, government spending, exports, and imports. It also includes employment, wages, other income, taxes, a monetary sector, and an energy sector. Finally, FOCUS permits the selection of

different exchange-rate determination and price-mechanism regimes. The experiments undertaken in this paper employ the following alternatives.

First, on the exchange-rate side, either

a) a flexible exchange rate – where the value of the Canadian dollar is determined by the demand for and supply of Canadian dollars – or
b) the use of monetary policy by the Bank of Canada to maintain the value of the Canadian dollar at the level established in the control solution.

Second, with respect to prices, either

a) price determination based on a mark-up rule over unit costs (a short- to medium-run rule) or
b) the price level determined by demand/supply equilibrium (only appropriate for long-run impact analysis).

As will be seen in Chapter 4, these policy levers (or behavioural assumptions) are *very* important in determining the effect of any particular policy.

To understand the results of the simulation experiments that follow, it is essential to have some idea of the dynamic response of the FOCUS model. The dynamic response of a model is its response over time to a change in some exogenous (or, more specifically, policy) variable. The response of the endogenous variables over time depends on the specification adopted in the model (that is, the economic theory incorporated) and the lag structure employed in the equation specifications. Consequently, no two econometric models will produce the same dynamic paths. De Bever et al. (1979) evaluate several Canadian econometric models (including FOCUS) in terms of their single- and multi-period multipliers. Jump and Dungan (1978) note that the response to a given change in real government nonwage expenditures is smaller (both initially and over time) in FOCUS than it is in some other models. He suggests that this difference is due to the relatively larger response of the price elasticities of imports and exports in FOCUS. A stimulative policy, because of its upward pressure on prices and the consequent curtailment of exports, has smaller induced effects in the FOCUS model than it does in most other models. On the other hand, there are very sharp differences in the dynamic response of the FOCUS model under the different policy regimes outlined above. It is its ability to accommodate these different regimes that makes the

FOCUS model a unique and useful tool for assessing the impact of policies on the economy.

PRISM, the second component of the modelling system used here, is an annual model that computes industrial and provincial detail in a manner consistent with the projections of FOCUS. Once a national projection is obtained from FOCUS, the PRISM model computes value-added by industry, on a national level, using the final demands from FOCUS and the Statistics Canada 1977 input-output matrix. This exercise yields twenty-two sectoral outputs. In order to obtain the provincial industrial disaggregation, shares by province are applied to the national industrial output figures. Adding across these provincial industrial outputs results in an estimate of real domestic product (at factor cost) by province. Once output by province by sector is obtained, other economic variables such as employment and income are computed.

The provincial-industrial sectors in PRISM can also be divided into two parts – base and nonbase – following an economic base model approach.[4] It is assumed that the sectors included in the base sector are primary industries and most manufacturing industries. The shares of these industries are exogenous, since it is assumed that the goods produced in the industries are freely transportable. That is, it is assumed that the shares of these industries are unlikely to respond to local economic conditions, since there is a national (or international) market for the goods they produce. Industries in the nonbase sector, on the other hand, are affected by local conditions and may therefore respond differently in different regions to a given shock.

While the structure of the PRISM model is quite simple, it is a multiregional model encompassing all provinces and does permit a fairly realistic analysis of regional impacts. It is therefore a most useful tool for analysing the effect of industrial policy and structural change.

The impact studies undertaken in Chapter 4 are modelled as follows: the policy in question is first modelled on a national level, using FOCUS. The next step is to use PRISM to obtain the industrial and provincial disaggregation of the policy impact. In doing this, it is possible to direct the initial final demand effect to a particular industry, to a particular province, or even to a particular industry in a particular province.[5] The ability to direct initial effects of particular industries is especially important for the modelling of 'specific' industrial policies.

As this discussion suggests, the FOCUS/PRISM system provides a fairly comprehensive and flexible tool for assessing the impact of industrial policies under a wide range of assumptions. However, because it allows only fixed proportions of technology in each industry, it is *not* an

appropriate tool for modelling specific industry tax incentives. Moreover, PRISM does not incorporate changes in the structure of industries or many other dynamic features of industrial development. Nevertheless, with careful modelling and sensitivity tests, the effects of at least some industrial policies can probably be approximated as well through this system as through any other systematic general equilibrium approach now available.

AN ECONOMIC PROJECTION FOR CANADA AND THE PROVINCES

In order to measure the magnitude of the impact of industrial policies, it is necessary to first establish a control solution for the national and provincial economies. It should be noted at the outset that the base solution of the model used in this study is *not* a forecast; rather it is simply one of a number of possible projections based on the assumptions of the model. This control projection is used only as a base against which the impacts of different policies may be measured. Tables 1 and 2 summarize economic growth historically and as projected through to 1995 by the FOCUS and PRISM models (see Dungan and Garesché 1982 for more detail on the base case used here). Although the base of these projections is of course somewhat out-of-date – with respect to the exchange rate, for example – it is perfectly satisfactory for present purposes, since our object is to depict patterns of response to particular policy actions rather than in any sense to forecast specific variables.

As in any macroeconometric projection, some important assumptions underlie these figures:

1 The U.S. economy exhibits growth below potential through 1983 and only slightly above potential throughout the anticipated recovery. For the periods 1986-90 and 1991-5 the U.S. real GNE growth rate averages 3.0 and 1.9 per cent respectively. Inflation in the U.S. remains quite high throughout the projection period. The Canadian dollar remains relatively stable through 1995 at about 81 cents U.S.

2 The energy sector continues to operate under the terms of the Canadian National Energy Program and the 1981 pricing accords.

3 Government policy continues along the path it has exhibited in recent years, with continued public sector wage and spending restraint beyond 1983. Monetary policy is assumed to remain relatively tight.

TABLE 1
Economic growth in Canada and the provinces

	1976-80	1981-5	1986-90	1991-5
Real GDP growth (average annual growth rates)				
Canada	3.0%	2.2%	3.3%	2.4%
Newfoundland	2.9	2.7	4.5	2.6
Prince Edward Island	2.0	0.9	2.9	2.3
Nova Scotia	2.3	2.1	3.7	2.9
New Brunswick	2.2	2.1	3.2	2.5
Quebec	2.8	1.0	2.8	1.9
Ontario	1.7	2.4	3.0	2.0
Manitoba	1.4	1.8	3.1	2.2
Saskatchewan	3.0	2.1	3.7	3.0
Alberta	7.0	3.0	3.9	3.6
British Columbia	5.0	3.0	4.0	3.2
Unemployment rates				
Canada	7.7	10.3	9.0	7.4
Newfoundland	14.9	16.2	14.4	12.3
Prince Edward Island	9.7	12.8	12.3	11.5
Nova Scotia	10.1	12.4	11.0	9.5
New Brunswick	11.8	14.1	13.2	11.4
Quebec	9.9	13.2	11.8	9.8
Ontario	6.8	9.4	7.9	6.3
Manitoba	5.6	7.3	6.2	5.8
Saskatchewan	4.4	5.8	5.2	4.1
Alberta	4.1	6.6	6.2	4.5
British Columbia	8.0	10.5	9.2	7.8

NOTE: The data in all the figures and tables in this book were generated by the author using the FOCUS/PRISM models of the University of Toronto, Institute for Policy Analysis.

Reality has already vitiated some of these assumptions, but – to repeat – their only function here is to provide a *base case* against which policy impacts (the deviations attributable to policy changes) are assessed.

As Table 1 indicates, these (and other) assumptions result in a rate of growth of real GDP in Canada that averages 3.3 per cent in 1986-90 and 2.4 per cent over the period 1991-5. This projection of economic activity reflects the continuing western movement of economic growth, since the western provinces tend to do somewhat better than the eastern provinces over the projection period. However, the regional shift in activity is very gradual over time.

In addition to the macroeconomic projections, the assumed development pattern of industry is also important to the analysis in this paper. Of particular note here, as Table 2 indicates, is the projected relative decline in importance of the manufacturing sector, continuing a

TABLE 2
Growth rates by industry – Canada

	1961-73	1974-80	1981-5	1986-90	1991-5
Agriculture, fishing	2.8%	2.5%	2.0%	1.5%	0.5%
Forestry	5.5	-0.3	-0.8	2.5	1.4
Mineral fuel	10.7	-1.2	-0.2	1.7	4.0
Other mining	4.3	0.9	-2.2	1.2	0.2
Food and beverages	4.3	2.0	1.2	1.4	0.5
Textiles, clothing	6.7	0.8	1.2	2.1	-0.6
Wood, furniture	5.8	1.4	-0.6	2.4	1.6
Paper and printing	4.9	2.7	0.5	2.8	1.5
Metal fabricating	6.0	1.8	0.3	2.1	0.6
Motor vehicles	8.7	-1.5	4.6	0.9	1.0
Machinery and other transportation equipment	15.3	2.7	-1.2	3.3	0.5
Electrical products	8.1	0.5	-0.3	1.6	-0.3
Chemical, petroleum	8.3	2.8	2.4	3.6	1.9
Nonmetallic mineral	5.9	-0.5	1.3	2.5	1.5
Other manufacturing	4.7	1.8	0.8	1.0	-2.5
Total manufacturing	6.6	1.6	0.9	2.2	0.8
Construction	4.5	2.4	2.1	2.3	2.5
Utilities	8.0	5.2	3.6	4.5	3.8
Total goods	6.0	1.9	1.2	2.4	1.5
Transportation	6.6	2.4	1.5	2.7	1.6
Communication	6.9	8.3	5.9	7.2	6.1
Trade	6.2	2.7	1.5	3.7	2.6
Finance, insurance, and real estate	5.2	5.0	3.3	4.0	2.6
Other service industries	6.0	5.6	4.0	4.4	3.6
Total service industries	6.0	4.5	3.0	4.2	3.2
Government sector	3.7	-0.0	1.5	1.5	1.6
Total (GDP at factor cost)	5.6	2.9	2.2	3.3	2.4

NOTE: See note to Table 1.

trend noticeable since the mid-1970s. Some features of industrial structure deserve special note. For example, growth in the motor-vehicle industry through the 1960s was very strong (exhibiting an average annual growth rate of almost 9 per cent through 1973). However, much of this early growth can be attributed to the Auto Pact, signed in 1965, which permitted auto assemblers and auto parts producers to move their products duty-free across the border. Hence, during the early years of the pact many new plants were built and others retooled.

Canada had an overall surplus in auto trade in 1970 and 1971, but a deficit appeared in 1972, reflecting the large deficit in trade of auto parts. Both the Ontario and federal governments then became concerned about the Auto Pact, since it seemed to favour auto assembly over parts manufacture in Canada. In an appendix to the 1976 Ontario budget (Ontario 1976), the government noted three difficulties facing the industry: productivity was not improving, the share of activity in auto assembly was declining, and the deficit on auto parts was rapidly increasing. In 1978, partly in response to these concerns, the federal government commissioned Simon Reisman to study the automobile industry (see Reisman 1978). His report suggested that Canada should encourage Japanese and European auto parts manufacturers to locate here. In addition, in an effort to improve Ontario's auto parts production, an Auto Parts Technology Centre was established under the provincial government's BILD program (Ontario 1981). However, the problems that these measures were intended to address have continued into the 1980s. Because of the auto industry's great importance to Ontario, its impact on the economy is examined further in the next chapter.

In contrast to the auto industry, the chemical and petroleum products industry performs quite well under the conditions assumed in this projection, an outcome that reflects presumed major new investment and readily available feedstocks. On the other hand, the electrical products industry performs rather poorly over the projection period, thanks to presumed import competition. This is the industry, presumably, that would be affected most by further support of the high-technology sector in Canada.

Finally, the resource-based industries (including agriculture, forestry, and mining), after experiencing strong growth through the early 1970s, have exhibited considerable weakness recently. This sector is assumed to show moderate growth again in the last half of the present decade. Given Canada's resource-based economy, the projection assumes only moderate foreign demand for Canada's primary products.

Table 3 sets out data on the industrial structure of Ontario and Quebec. Both Quebec and Ontario grow somewhat more slowly than the nation as a whole, so their share of total activity declines. In Quebec, growth in manufacturing output is weak through the 1990s. This poor outlook can be explained by especially poor performances in the textile and clothing and the food and beverages industries. The utilities industry, however, continues to grow strongly – a reflection of continued development of James Bay. In Ontario, performance in the manufacturing sector reflects the national performance of some of the province's important industries – wood and furniture, machinery and

TABLE 3
Industrial shares for Ontario and Quebec

	1981		1986		1991	
	Ont.	Que.	Ont.	Que.	Ont.	Que.
Agriculture	29.2	12.8	29.1	12.3	28.9	11.8
Forestry	14.4	19.8	13.0	17.1	12.3	15.9
Mining	15.0	8.3	12.7	6.3	11.3	5.5
Food and beverages	44.9	28.1	45.1	27.5	44.9	27.2
Textiles and clothing	38.2	53.3	40.5	50.4	41.8	48.7
Wood and furniture	25.0	24.0	24.1	24.1	23.1	24.2
Paper and printing	39.4	31.1	38.5	29.8	37.6	28.5
Primary metals	58.4	25.5	58.0	25.2	56.6	25.9
Motor vehicles	89.1	5.7	89.4	5.2	88.6	5.6
Machinery and other transportation equipment	51.2	28.1	47.8	28.0	44.5	27.9
Electrical products	70.0	23.9	71.5	21.9	72.7	20.0
Chemicals and rubber	55.7	25.3	55.0	24.4	54.4	23.5
Nonmetallic	47.7	22.9	46.4	21.8	45.1	20.7
Other manufacturing	67.2	25.3	67.9	24.2	68.5	23.2
Total manufacturing	52.7	26.9	52.6	25.9	51.7	25.4
Construction	25.2	19.4	25.5	15.9	24.2	14.1
Utilities	33.3	29.9	33.9	30.6	31.7	28.7
Services	36.9	24.3	37.9	22.6	37.7	22.1
Government	36.0	22.2	35.8	21.1	35.5	20.5
Total output	38.5	23.7	38.9	22.3	38.3	21.7

NOTE: See note to Table 1.

other transportation equipment, and electrical products – all of which are projected to have slow growth.

Finally, it should be reiterated that the control solution set out briefly in this section is *not* a forecast. It is only one of many possible projections of economic growth in Canada. This projection is conditional on such exogenous variables as U.S. economic activity, and the projections would obviously change if the underlying assumptions changed. Indeed, if these simulations had been carried out in mid-1984 instead of in mid-1983, some of the underlying assumptions would almost certainly have been different. Thus the control solution used here does not, in all likelihood, reflect reality very closely. Nevertheless, since we are interested primarily in the pattern of the *changes* that would result if particular policies were altered, it does provide an appropriate base against which the impact of industrial policies can be measured.

Obviously the size of the economic response to a change in a particular variable depends on the position of the economy in the business cycle. For example, in the short run a stimulative policy enacted during a period of economic recession will likely yield larger real output changes and smaller changes in inflationary pressures than the same policy enacted during a period of economic boom. However, since in the simulation experiments that follow the focus is on the medium to long term, the starting point of the policy is *not* crucial to an assessment of changes in either the potential growth path of the economy or the reallocation of resources that result from a given macroeconomic or industrial policy.

4
The impact of industrial policy in Canada

This chapter undertakes a simulation of certain policies that may affect the industrial structure of Canada. As was indicated in Chapter 2, such policies may be classified broadly as general macroeconomic conditions, general structural conditions, general industrial policies, and specific industrial policies. More specifically, the study considers the following policies:

1 The effect on industrial and regional development of a depreciation of the Canadian dollar. This is a *general macroeconomic policy* (or condition).

2 The effect on industrial structure (particularly in Ontario) of relatively lower energy prices. This is an example of a *structural condition* (or policy).

3 The impact of an across-the-board investment tax credit as an example of a *general industrial policy*.

4 Two examples of *specific industrial policies*: we examine the effects of a policy designed to foster the high-technology sector in Canada (an example of 'picking the winners') and, second, the impact of further erosion of the motor-vehicle industry in Canada (to illustrate the possible need for transitional assistance).

These policies are assessed within a general framework that allows for interaction between various sectors of the economy. While it is obviously not possible to include all the interactions that take place in the economy in an econometric model (as noted earlier, the particular modelling system used here – like all other possible models – certainly has its limitations), to ignore the effects of industrial policies on the economy in

general and the consequent feedback on the industries themselves, as has often been done in the industrial policy literature, may lead to quite misleading conclusions about the effectiveness of different policies.

The various policies considered are analysed in terms of their impacts on (a) overall growth and inflation, (b) industrial structure, and (c) regional development. In examining the results of simulation exercises such as those discussed here, it is often difficult to determine whether the impact of a policy is 'small' or 'large'. For example, while the *growth rate* of real GNP may have returned to that exhibited in the control solution by the end of the impact period, the *level* of real GNP may be significantly different. In the discussion of the simulations, therefore, we shall indicate both growth rate effects and GNP level effects.

EFFECTS OF A DEPRECIATION OF THE CANADIAN DOLLAR

Some observers have suggested that part of the industrial strategy in Japan and West Germany has been the creation of a macroeconomic environment conducive to industrial growth. Part of this environment, as Shepherd indicates, was a competitive currency:

> A principal feature of both Japanese and German economic policy, over the twenty years after their resurgence after World War II, was precisely the management of currency levels to accommodate their trading strategy ... (1980, 11)

Along with this competitive currency went a steady fiscal policy and specific aid to export industries. In both the Japanese and German cases, growth was export-led.[6]

It may of course be argued that exchange-rate policy is not an industrial policy but rather a monetary policy. Nevertheless, it is obviously important to examine the effect of any change in the exchange rate, since it will have significant effects on industrial and regional development in Canada. Indeed, as we shall see, the policies with the strongest 'industrial' effects may well be general macroeconomic policies such as exchange-rate policy rather than specifically industrial policies.

In the control solution, the Canadian dollar does not move very much, remaining in the neighbourhood of 81 cents U.S. Shepherd has argued that in order to keep exports competitive it is necessary 'to make policy decisions to deliberately maintain the Canadian dollar at its current level or lower' (ibid., 10). In order to measure the impact of such exchange-rate depreciation, we have therefore allowed the Canadian dollar to depreciate relative to the level assumed in the base case by roughly 8 cents against the U.S. dollar by 1985. In doing this, we have in

effect assumed that the monetary authority is able to control the exchange rate effectively through its policies.

Table 4 sets out the effects of such a depreciation on the economy. The first part of the table shows the impact on the national economy as a whole. As might be expected, the trade balance (in millions of 1971 dollars) shows a marked improvement: in 1985, for example, the change in the real trade balance is almost $1.4 billion. Besides the growth in final demand that is a direct result of foreign trade expansion, there is growth that results from an increase in investment expenditures. This increase comes about as follows: since it has been assumed that the depreciation occurs through the use of monetary policy, the Bank of Canada is in effect assumed to follow a less restrictive policy than it follows in the control solution; the result is lower interest rates. As Table 4 shows, the short-term interest rate is more than 1 per cent lower in this analysis than it is in the control solution, with a consequent stimulation to business fixed capital formation. The resulting stronger growth in output in turn implies increased employment growth and, consequently, a lower unemployment rate throughout the projection period.

For the nation as a whole, it might appear that this policy is, under the assumed conditions, a good one, at least when considered in terms of the GNP *level*. However, it is also important to consider the effect of the policy on real economic growth and on inflation. Figures 1 and 2 show the impact of the assumed depreciation of the Canadian dollar on, respectively, the GNP growth rate and the inflation rate (as measured by the percentage change in the implicit GNP deflator). Of particular note here is the fact that while real growth in output increases significantly in the first three years, in later years the growth rate of real GNP returns to the rate exhibited in the control solution. At the same time, however, the inflation rate remains *above* that in the control solution throughout the simulation period. As the Canadian dollar depreciates, the price of imported goods rises; since imported goods are such an important component of Canada's economic structure, inflation increases.

This simulation illustrates the importance of distinguishing between the effects of policies on levels and their effects on growth rates. By the end of the simulation period (1990), real GNP is some $4.5 billion (in 1971 dollars), or 2.8 per cent higher than it is in the control solution, but the price level (as measured by the GNP deflator) is over 4 per cent higher. On the other hand, as Figure 1 demonstrates, there is virtually no difference beyond 1986 between the rate of real growth in the control solution and the rate in the simulation. However, inflation is higher throughout the period, and even at the end of the period the rate of

TABLE 4
Impact of a depreciation of the Canadian dollar (average annual change from the control solution)

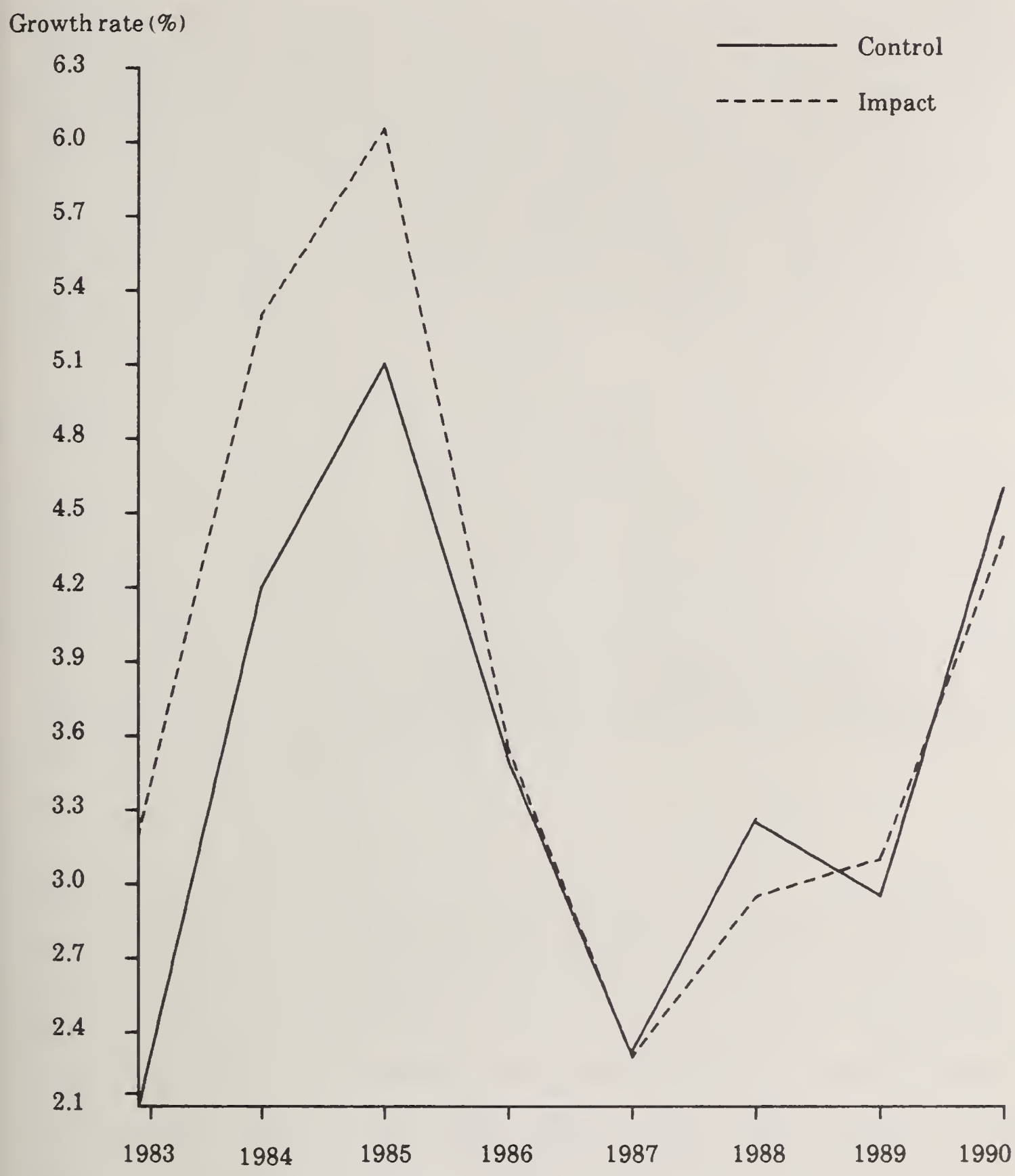
	1983-6	1987-90
National		
GNP (millions of 1971$)	3,187	4,495
Consumption (millions of 1971$)	444	1,872
Investment (millions of 1971$)	1,230	1,377
Exports (millions of 1971$)	891	920
Imports (millions of 1971$)	-43	-315
Interest rate (%)	-0.89	-1.19
Unemployment rate (%)	-0.71	-0.93
GNP price deflator (1971 = 1.00)	0.06	0.19
Industrial		
Manufacturing output (millions of 1971$)	1,064	1,293
Primary metals	190	214
Motor vehicles	230	237
Machinery and other transportation equipment	144	164
Chemical, rubber, and petroleum products	107	152
Services output	1,484	1,990
Goods output	1,551	1,884
Provincial		
GDP (millions of 1971$)		
Ontario	1,327	1,698
Quebec	653	836
Alberta	315	400
British Columbia	352	449

NOTE: See note to Table 1.

inflation is approximately 0.5 per cent higher than it is in the control solution. While a policy of exchange depreciation could achieve a lower unemployment rate, owing to its effects on the demand side of the economy, there would thus be little effect on overall growth in the longer run.

At a more disaggregated level, as exports are stimulated, so is output in a number of sectors of the economy. The second part of Table 4 indicates, for example, that the impact of the depreciation on the manufacturing sector is largest in primary metals, motor vehicles, machinery and other transportation equipment, and the chemical, rubber, and petroleum products industries.[7] In 1985, when the effect of the depreciation has the largest impact, the increase in the output of these industries relative to the control solution is estimated to range from 5 to 13 per cent. There is also some increase in output in the

Figure 1
Effect on GNP growth of a depreciation of the Canadian dollar

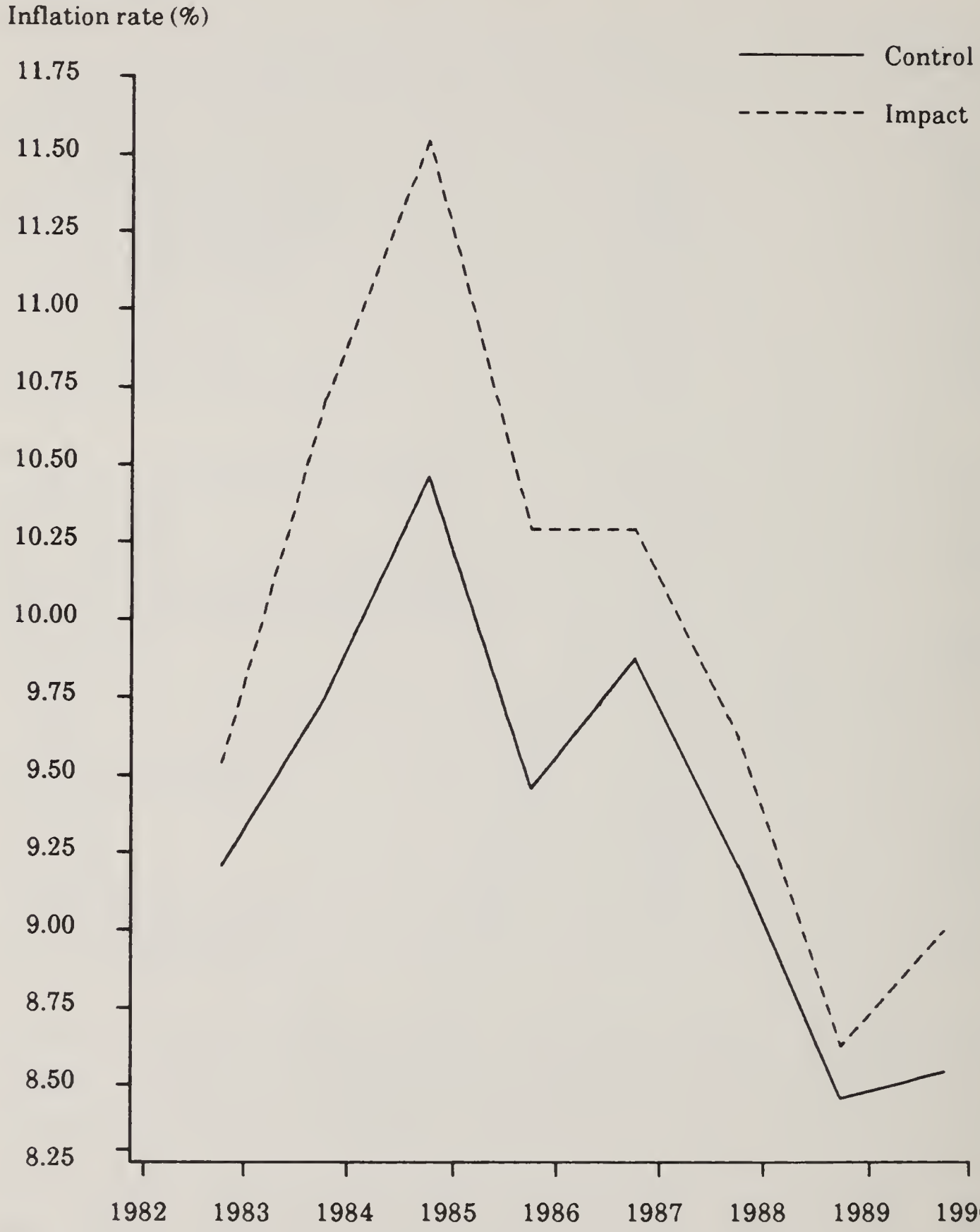


NOTE: See note to Table 1.

resource-based industries (agriculture, forestry, and mining); the service industry also increases, in response to the increase in domestic activity.

The impact of exchange-rate depreciation at the provincial level basically reflects these changes in industrial output. Ontario, which has

Figure 2
Effect on inflation of a depreciation of the Canadian dollar



NOTE: See note to Table 1.

the largest share of motor-vehicle production, exhibits the largest increase in GDP. Next comes Quebec, which also has significant manufacturing activity. Alberta and British Columbia also experience increases in GDP, owing to their resource bases.

This simulation suggests first that a conscious policy of depreciating the Canadian dollar, which some observers have recommended, would not, in the medium term, result in an increase in the growth of real output. *Levels* of output and employment would increase (and the unemployment rate would decrease) as a result of depreciation; however, given the nature of the Canadian economy, the greater impact over an extended period would be on inflation rather than on industrial growth. Second, since most of the beneficial impact of depreciation comes about from the initial growth of exports, some form of special support to help industries expand their export markets during the depreciation period might improve the overall outcome of such a policy. That is, rather than being a substitute for special aid to export industries, as is commonly asserted, exchange-rate depreciation may work best when it is complemented by such aid, which would offset some of the detrimental effects of the depreciation on the economy as a whole.

If new international markets would be permanently opened to Canadian firms by such a policy mix, the result might be a higher growth rate of real output over the longer term. A policy designed to help Canadian exporters find new buyers (through trade fairs or other promotional activities) at the same time that Canadian-produced goods became relatively cost-attractive might increase the potential growth rate in Canada. Unfortunately, the FOCUS model cannot shed much further light on this possible policy combination, since it treats exporting industries as having demand effects only.

THE IMPACT OF A REDUCTION IN ENERGY PRICES

When world oil prices escalated rapidly in late 1973, there was considerable concern about the effect this development would have on industrial structure. In particular, observers wondered what form the adjustment to the higher oil prices would take and how long the adjustment would last. While it is surprisingly difficult to analyse the real effects of higher oil prices, some authors have suggested that they both contributed to a slowdown in productivity growth in the industrialized nations (see, for example, Eckstein and Tannenwald 1981) and caused a reallocation of resources and consequent changes in industrial structure.

Table 5 sets out the pattern of energy prices and Ontario industrial development during the period of rapidly rising energy prices. The share of manufacturing activity in total output in Ontario has indeed fallen somewhat since the rapid escalation of oil prices began at the end of 1973, a circumstance that suggests that the energy price increases did perhaps play a role in altering the province's industrial structure.

TABLE 5
Energy prices and industrial development in Ontario

	Crude oil wellhead ($/bbl.)	Natural gas Toronto City ($/mcf)	Primary metals	Motor vehicles	Chemicals & rubber	Electrical products	All manufacturing	Services
			(percentage of total output)					
1973	3.80	–	–	–	–	–	31.6	42.8
1974	6.50	0.82	–	–	–	–	31.2	43.4
1975	8.00	1.25	5.4	5.1	3.2	2.6	29.4	45.1
1976	9.00	1.41	5.4	5.6	3.3	2.5	29.7	44.8
1977	10.75	1.68	5.3	6.1	3.3	2.3	29.6	45.1
1978	12.75	2.00	5.2	5.8	3.5	2.3	30.2	45.3
1979	13.75	2.15	5.4	5.0	3.8	2.6	30.9	45.1
1980	16.75	2.60	5.3	4.0	3.7	2.6	29.4	46.0
1981	18.96	3.07	5.3	3.6	3.7	2.5	28.4	46.2

NOTE: See note to Table 1.

However, it must be remembered that many other factors were at work during the period of rising energy prices (for example, the anti-inflation program (1975-8), the depreciation of the Canadian dollar in late 1976, and the recession of 1974-5). Indeed, given the large increases in energy prices, the manufacturing sector may perhaps be considered to have performed quite well in relative terms over this period.

As Pindyck (1981) indicates, there are two ways in which higher energy prices affect the economy. First, there is a direct effect – the reduction of total real national income. Second, there is an adjustment effect that arises because of institutional rigidities (for example, price rigidities or low substitutability in the production process). Pindyck suggests that economic policy may be important in moderating the adjustment effects of energy price increases.

Since the world price of oil has recently *fallen* significantly, it is of interest to consider the impact of this change on industrial and regional development in Canada: if energy price increases are bad, are decreases good? Following Pindyck's analysis, it might be expected that, if no other changes took place, total real income would increase as a result of lower energy prices. Further, the adjustment process should be much easier, since much of the difficult adjustment undertaken in the 1970s was intended to improve energy efficiency (and therefore productivity), and no such wrenching changes would be needed this time.

Unfortunately, the FOCUS/PRISM system is not particularly appropriate for assessing the effects of energy price changes on industrial structure, since, as we noted earlier, the method through which output is determined in this system is based on the fixed technology assumption of an input-output model. Consequently the change in energy prices can be captured only through its income effects and not through its potentially important interindustry effects or through effective energy conservation shifts.

In Canada's case, however, lower energy prices are a two-edged sword even on the demand side. For example, when oil prices in the international market decline, some major energy-related investment projects cease to be viable; as a result of the reduced level of economic activity, total real income will fall. Changes of this sort must also be taken into account when assessing the impact of a reduction in energy prices. Table 6 sets out the assumptions made here regarding oil prices and production. Given the assumed lower blended oil price, projects such as Alsands and Cold Lake will be either delayed or indefinitely postponed, with the result that Canadian production of petroleum will be considerably reduced. The impact of the Alsands cancellation on the Canadian economy is analysed in Dungan (1982).

TABLE 6
Assumptions about oil price and production

	1983-6		1987-90	
	Control	Impact	Control	Impact
Refiners' acquisition price				
($ per barrel)	47.24	34.17	77.67	46.08
average annual growth (%)	14.1	5.9	12.9	8.0
Total petroleum production				
(millions of barrels)	501.0	500.3	537.8	486.3

NOTE: See note to Table 1.

The assumption that some of the 'mega' projects will not be undertaken obviously results in lower national investment expenditures and consequently in a *reduction* in real output in the national economy. However, the effect on the provincial output shares is perhaps of more interest here. Table 7 sets out these output shares (based on provincial GDP) for selected years of the simulation period. As the table shows, the reduction in oil prices *does* benefit Ontario in relative terms in the sense that the share of national output produced in Ontario is larger in 1990 under the scenario of lower oil prices. It should be stressed, however, that the *absolute* level of economic activity is lower, since with the postponement or cancellation of some resource-development projects national economic activity is lower. Although the net effect on Ontario is negative, Ontario does better than most other provinces.

Finally, it must again be emphasized that this analysis covers only the effects on aggregate demand (under flexible exchange rates) of a reduction in oil prices and oil-related investment. As noted above, since PRISM does not at present contain flexible form-production functions, it is not possible to assess the interindustry impact of lower oil prices, so the industry adjustment effects that would undoubtedly follow a major and long-run downward adjustment in oil prices are not captured in this analysis at all. Nevertheless, the simulation provides a good illustration of the possibly quite different regional and national effects of national structural policies.

THE EFFECT OF AN ACROSS-THE-BOARD INVESTMENT TAX CREDIT

Investment tax credits have often been used in Canada to stimulate investment expenditures and to create a climate conducive to business

TABLE 7
Provincial output shares: control solution and impact of reduced oil prices (based on real GDP at factor cost)

	1983		1986		1990	
	Control	Impact	Control	Impact	Control	Impact
Newfoundland	1.4	1.3	1.4	1.4	1.3	1.5
Prince Edward Island	0.3	0.3	0.3	0.3	0.3	0.3
Nova Scotia	2.3	2.5	2.3	2.6	2.3	2.6
New Brunswick	1.8	1.9	1.8	1.9	1.8	1.9
Quebec	23.4	22.7	23.2	22.1	22.9	21.2
Ontario	38.6	38.8	38.4	38.4	37.8	38.6
Manitoba	3.8	3.9	3.8	3.9	3.7	3.8
Saskatchewan	3.9	3.8	3.9	3.8	4.0	3.9
Alberta	11.8	12.2	12.3	12.5	13.0	12.9
British Columbia	11.8	12.2	11.9	12.7	12.1	13.1

NOTE: See note to Table 1.

expansion (Bird 1980). Ontario, for example, introduced an investment tax credit in the early 1970s, even before the federal government introduced the credit in 1975, and there have been many other examples of tax favours (especially favours to resource-based industries) in Ontario (see Milne 1982).

The policy of giving across-the-board investment tax credits is obviously a general industrial policy. The credit is not directed to any particular sector or industry; rather, investment in the aggregate is supposedly stimulated, and the precise industrial allocation is determined by the market mechanism.

Such an industrial policy may be thought of as one intended to stimulate the supply side of the economy, although it does, of course, also have demand-side effects. On the supply side, the increased investment brought about by the tax credit will enhance the capital stock, and this increase will in turn boost output through the production function. Since investment is also a component of final demand, aggregate demand will be stimulated as well. The net effect, policymakers hope, will be an increase in the level of output and a decrease in the inflation rate over some period of time. The effect on inflation, however, is moot, since the magnitude of change depends on the assumptions made about the price adjustment mechanism and the role of expectations.

In the American case, Adams and Duggal (1982) found that the aggregate supply curve shifted to the right in response to an investment

tax credit, thus indicating some capital deepening. On the other hand, this shift caused the unemployment rate to rise. This result is not too surprising: while incentives to investment may shift the supply curve, there is no reason why the aggregate demand and (new) supply curves should intersect at full employment. In such a situation, Adams and Duggal argued, the appropriate policy response may be to provide a demand stimulus in addition to that provided by the tax credit itself. The parallel to the exchange depreciation case modelled above is of interest: again, instead of two policies being substitutes, as might usually be thought to be the case, they turn out to be complements in the sense that both are needed to achieve the two presumed policy objectives (inflation control and growth in the exchange-rate case; growth in output and in employment in the investment credit case.)

In the Canadian case, Braithwaite's (1983) examination of the impact of several different investment incentives on economic growth indicated that lowering the price of capital relative to the price of output increased expenditures on investment. Further, the increased capital stock resulted in an increase in the rate of growth of labour productivity, implying some moderation in the inflation rate. Over time, however, the increase in consumption expenditures caused by the increase in real income was larger than the increase in investment caused by the investment incentive; the result was that both the current-account deficit and the government deficit became larger. The current account worsened because a considerable portion of investment goods in Canada are imported, and also because real income increased. The government deficit increased because increased incentives to investment (whether through investment tax credits or a reduction in the corporate tax rate) reduce government revenues even in the long run. Braithwaite's analysis, which used the CANDIDE model of the Economic Council of Canada, provides still further evidence of the importance of model structure and policy assumptions in assessing the estimated economic impact of different policies. For example, Braithwaite indicated the importance of following an accommodating monetary policy at the same time that the investment incentives are in place. The simulation experiments conducted in the present paper evaluate the investment tax credit under different explicit macroeconomic regimes.

In modelling investment tax credits in the system used in this study, the first step is to determine the direct impact on investment of the credit *without* considering the multiplier effects. In the particular experiment considered here, the investment tax credit was changed to achieve a direct increase in investment of $500 million in 1971 dollars (split 30:70 between nonresidential construction and machinery and equipment

investment). This procedure allows the size of the total (including direct and induced) impact to be measured, given this direct effect on investment. Since the investment tax credit results in a decrease in revenue for the federal government, the budget position deteriorates. It is assumed in the following analysis that this is a 'pure' fiscal policy – that is, the government does not finance the increased deficit by selling bonds to the Bank of Canada.

Table 8 sets out the effects on the national economy of this investment stimulus under different assumptions regarding policy regimes. Part A of the table shows the impact given a freely floating Canadian dollar, while Part B sets out the effects on the aggregate economy under the assumption that through the use of monetary policy by the Bank of Canada the exchange rate remains fixed at its level in the control solution. Both of these experiments assume a markup pricing mechanism – as noted earlier, an assumption that seems more appropriate to the short-to-medium run than to the long run. Finally, Part C of the table presents the results with a flexible pricing mechanism, which may be more appropriate for the long run, and a floating exchange rate.

As Table 8 indicates, the impact of an investment credit varies significantly with the assumptions made. In the flexible exchange-rate case, for example, the Canadian dollar loses roughly 2 cents on average against the U.S. dollar. This depreciation results in a stimulus to exports (besides the initial investment increase); but, as with the policy of depreciating the Canadian dollar analysed earlier, the result is also to increase inflationary pressures in Canada. On the other hand, if the exchange rate is assumed to be kept constant (through monetary policy), the result is an interest rate higher than the rate in the control solution and, consequently, a reduction in the initial impact of the incentive on investment and a dampened impact on the overall economy. This result clearly indicates the importance of evaluating the investment incentive in conjunction with the macroeconomic environment. It is quite possible, as Part B of Table 8 shows, to follow policies on the macroeconomic level that virtually undo the intended effect of the investment credit.

The impact of the investment incentive under the assumption of a flexible pricing mechanism is perhaps the most interesting. The impact on GNP is not very different in this case from the impact under the assumptions of a flexible exchange rate and mark-up pricing. However, the Canadian dollar does not depreciate as much, since there is a larger aggregate supply response from the initial investment increase and this holds down the inflationary pressures. Indeed, in the last two years of the simulation the GNP deflator is lower than it is in the control

TABLE 8
Impact of an investment tax credit (average annual change from the control solution)

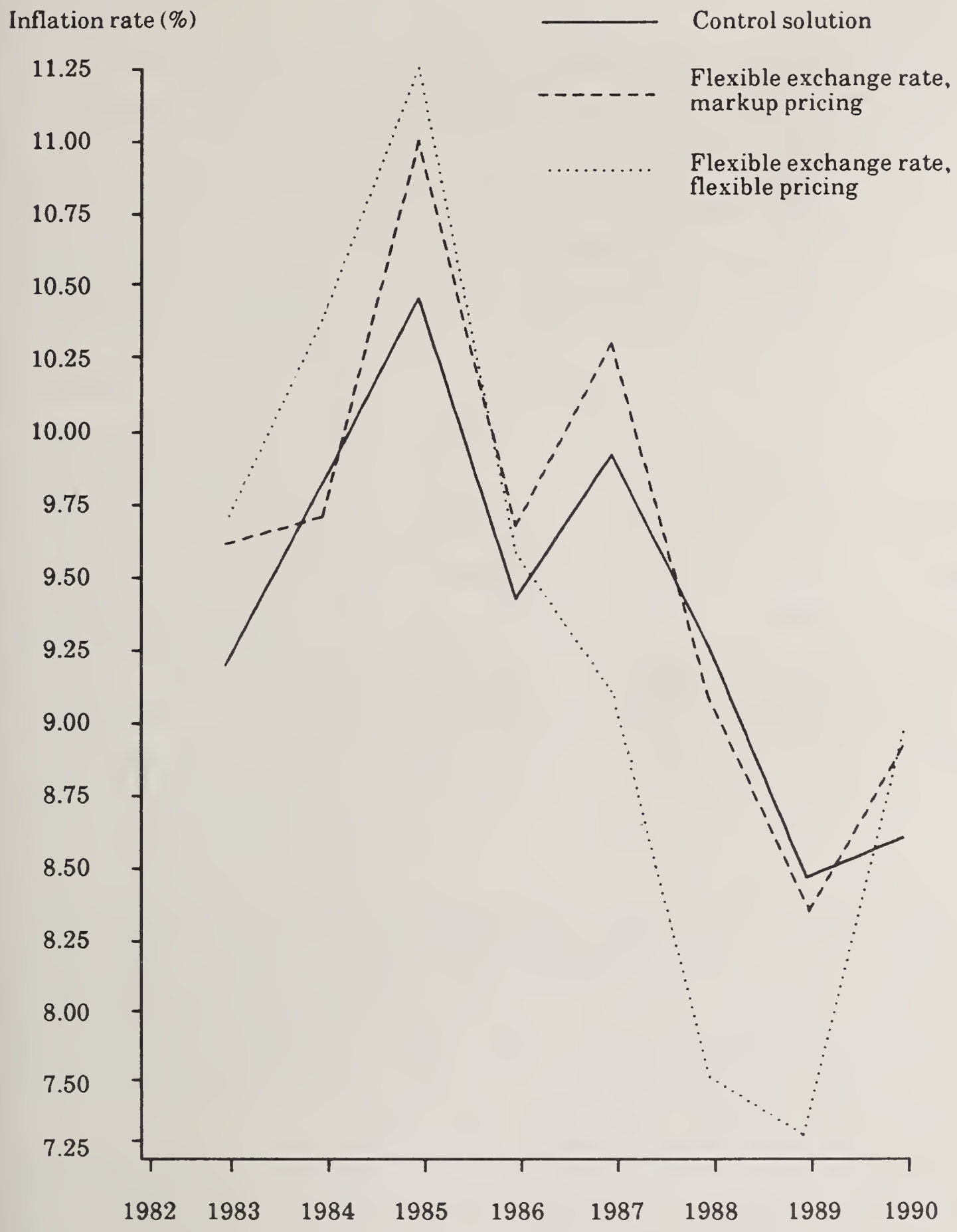
	1983-6	1987-90
A *Flexible exchange rate – markup pricing*		
GNP (millions of 1971$)	1,239	1,349
Consumption (millions of 1971$)	487	1,015
Investment (millions of 1971$)	682	671
Exports (millions of 1971$)	306	120
Imports (millions of 1971$)	343	447
Interest rate (%)	0.32	0.46
Unemployment rate (%)	-0.43	-0.56
Exchange rate	0.02	0.06
GNP price deflator (1971 = 1.00)	0.02	0.02
B *Exchange rate as in control solution – markup pricing*		
GNP (millions of 1971$)	210	243
Consumption (millions of 1971$)	231	550
Investment (millions of 1971$)	308	354
Exports (millions of 1971$)	7	-72
Imports (millions of 1971$)	373	592
Interest rate (%)	0.57	0.80
Unemployment rate (%)	-0.14	-0.28
GNP price deflator (1971 = 1.00)	0.00	0.01
C *Flexible exchange rate – flexible pricing mechanism*		
GNP (millions of 1971$)	1,097	1,200
Consumption (millions of 1971$)	479	901
Investment (millions of 1971$)	717	416
Exports (millions of 1971$)	213	142
Imports (millions of 1971$)	417	227
Interest rate (%)	0.44	0.22
Unemployment rate (%)	-0.49	-0.35
Exchange rate	0.03	0.10
GNP price deflator (1971 = 1.00)	0.04	0.01

NOTE: See note to Table 1.

solution. Since flexible pricing probably approximates more closely to long-run reality and markup pricing to the short run, the result of an investment incentive might (under flexible exchange rates) therefore be some initial increase in inflation, subsequently damped down by a supply-side response – although more slowly than in the simulation in which flexible pricing is assumed to prevail throughout the period.

Figure 3 dramatically illustrates the different impacts on the inflation rate of these various assumptions. The markup pricing rule, which is, again, the more appropriate for short-run analysis, results in an inflation

Figure 3
Effect on inflation of an investment tax credit



NOTE: See note to Table 1.

rate above the rate in the control solution until the last three years. On the other hand, the flexible pricing mechanism, which is more appropriate for long-run analysis, exhibits a lower inflation rate much

earlier. Since both assumptions result in roughly the same impact on real GNP, these simulations demonstrate the crucial role of the pricing mechanism. Essentially, the difference is that with a flexible pricing mechanism there is a supply response and therefore increased productivity growth and, possibly, increased potential growth of the economy, while with a markup pricing rule most of the impact is a demand effect, pulling up prices.

Table 9 presents the industry effects for the flexible exchange rate, flexible price rule case. The largest effects are in the manufacturing sector, with the primary metals, motor vehicles, and machinery and other transportation equipment industries exhibiting the largest increases – for the last two of these industries, there is an almost 5 per cent increase over the control solution at the height of the impact. On a regional level, Ontario receives most of the benefit of increased investment incentives; roughly 61,000 jobs are created in 1986 alone – a 1.4 per cent increase over the control solution at the height of the impact.

Obviously, many assumptions other than those already mentioned have had to be made in analysing the effects of a general investment tax credit. Since some of these assumptions are crucial in determining the impact of this policy, at least two of them should be made explicit here. In the first place, it is very difficult to determine exactly how investment tax credits affect investment. In the FOCUS model, the impact is allocated to aggregate investment rather than on an industry-by-industry basis. As Braithwaite (1983) indicates, there can be significant differences across industries in the effectiveness of investment incentives and therefore different impacts on productivity. Braithwaite suggests that industries that exhibit the largest increases in productivity should be given larger incentives. Unfortunately, there is not very much research on the disaggregated industrial effects of investment incentives; consequently, until both the effects of such incentives on investment spending as well as their financial implications are understood, the general incentive type of policy modelled here is likely to be a preferable policy instrument to incentives that target particular industries and, therefore, more commonly used.

Questions can also be raised about the specification of an appropriate aggregate investment function and about how incentives should enter it. For example, should the function be of the neoclassical sort (following Jorgenson 1963), where the tax credit enters as part of the user cost of capital? Or should a more general specification be adopted, in which the incentive enters separately? In the FOCUS model, the first of these approaches is followed, so that the investment tax credit affects the user cost of capital.

TABLE 9
Industrial and provincial impact of an investment tax credit – flexible exchange rate, flexible price rule (average annual and percentage changes from the control solution)

	1983-6		1987-90	
	Level	% change	Level	% change
Industrial output (millions of 1971$)				
Manufacturing	427.7	1.63	409.5	1.45
Primary metals	73.9	1.75	62.3	1.39
Motor vehicles	86.8	3.71	60.0	2.44
Machinery and other transportation equipment	68.2	2.93	51.1	1.99
Construction	125.8	1.80	85.6	1.15
Services	620.5	0.92	733.3	0.94
Total goods	647.5	1.52	598.3	1.23
Provincial impact				
GNP (millions of 1971$)				
Quebec	270.9	0.95	301.3	0.96
Ontario	540.3	1.10	590.0	1.07
Alberta	135.3	0.86	141.6	0.79
British Columbia	147.9	0.92	158.2	0.85
Employment (thousands)				
Quebec	21.8	0.80	17.1	0.60
Ontario	39.9	0.92	32.4	0.70
Alberta	9.6	0.83	6.1	0.48
British Columbia	10.8	0.83	7.5	0.52

NOTE: See note to Table 1.

The openness of the capital market in Canada may have important implications for the effect of investment incentives. For example, if investors borrow in the U.S. in order to invest in Canada and thereby take advantage of the tax credit, then the resulting capital inflow may cause some appreciation of the Canadian dollar and, with it, a worsening of the current account and a slowdown in economic activity in Canada. In the simulations presented above, it has been arbitrarily assumed that about one-half of the investment financing comes from abroad; so this effect is taken into at least partial account. A more refined analysis would also take into account the important role of multinational firms in Canada. Such firms presumably assess the *relative* gains from investing in the various countries in which they operate; the result is that the 'average' incentive policy in all countries will to some extent determine the impact of an incentive in any particular country.

As even this brief discussion should indicate, many complex issues must be borne in mind when one sets out to interpret the economic effects of an investment tax credit. However, even the relatively simple simulations undertaken here demonstrate both the need to assess the impact of investment tax credits in the context of a complete model of the economy (given the demonstrated importance of the macroeconomic environment) – and the difficulty of doing so with any confidence (given the lack of evidence on the way investment incentives affect particular industries).

SPECIFIC INDUSTRY POLICIES

Very specific industrial policies have often been advocated as appropriate in Canada. Recently, for example, Steed argued that Canadian industrial policy should consist of two parts. First, policy should help the transition of weaker firms; second, it should 'support those sectors and firms currently or potentially competitive internationally' (1982, 135).

Two examples of such 'specific' industrial policies are considered in this section. The first involves a strategy of 'picking the winners' – in particular a strategy of fostering high-technology industry in Canada. The second specific policy considered here concerns a maturing industry – the motor-vehicle industry.

Fostering high-technology industry in Canada

In the discussion of industrial policy in Canada it has often been suggested that the high-technology sector be supported. There are at least two possible purposes for such support: (1) to encourage the development of a high-technology industry in Canada or (2) to enable industry to use the available technology in its production processes. For example, the BILD statement of the Ontario government asserted that

> productivity improvement on the scale that is required will come from the new technologies, such as microelectronics and biotechnology, and the emerging industries that will be built on these technologies. (Ontario 1981, 26)

There are two conflicting views of the impact on the economy of the development of high technology. The first view is that since substantial productivity gains arise from high technology, the unemployment rate will rise and remain high if a high technology sector is supported. The second view is that, even though the new technology may be labour-

saving, owing to the dynamic nature of the economy there will, over time, be effects on demand that will reduce the unemployment rate.

For a number of reasons, it is very difficult to use FOCUS/PRISM (or indeed any model of the economy) to model the effect of fostering high-technology industry. First, since the fixed technology assumption of the input-output table does not allow new technology to be adopted endogenously in the model, assumptions must be made outside the model about the effects of the new technology. Second, it is difficult to know how government financial assistance will affect industry, since, once again, we do not have reliable information about how different industries respond to incentives. Finally, it is also difficult to know how high technology will be used by various sectors of the economy. For example, it is unclear at present how computers will affect various industries in the manufacturing sector or the service sector. Consequently, it is difficult to measure the impact of their introduction on productivity levels or on rates of productivity growth.

For the purposes of the present simulation, it has been assumed that the government gives support to the high-technology sector via capital assistance. This assistance shows up as new investment in the electrical products industry and in itself amounts to a demand-side effect. However, since the production and use of high technology involves increased productivity levels, there will be supply-side effects as well. In particular, it is assumed in this experiment that the *average* productivity in the economy as a whole will increase. In this sense, the simulation experiment considers both sides of the high-technology issue – it deals with both the encouragement of production of high technology and the use of high-tech products by other industries. The net result may not be a greater level of output, but rather a more cost-effective allocation of capital and labour.[8] Rough as it is, this simulation should serve at least to indicate the likely direction and rough magnitude of the impact of fostering a high-technology sector in Canada.

Table 10 sets out the results of assuming that the federal government undertakes a $600 million (current dollar) outlay in capital assistance to aid the development of the electrical products industry.[9] Several different assumptions might be made about the form and impact of this assistance. It might be assumed, for example, that the capital assistance used by the electrical products industry to create investment is an outright grant (resulting in a $200 million 1971 dollar increase in new investment). Alternatively, it might be assumed that for every dollar of capital assistance from the government private industry adds another dollar (resulting in a $400 million 1971 dollar increase in investment).

TABLE 10
Fostering a high-technology sector in Canada (average annual change from the control solution)

	1983-6	1987-90
Flexible exchange rate		
GNP (millions of 1971$)	1,956.8	6,564.1
Consumption (millions of 1971$)	328.4	938.1
Investment (millions of 1971$)	203.8	1,554.6
Exports (millions of 1971$)	764.3	3,109.3
Imports (millions of 1971$)	-481.0	-493.5
Interest rate (%)	-0.63	-1.63
Unemployment rate (%)	0.17	-0.18
Exchange rate	-0.03	-0.07
GNP price deflator (1971 = 1.00)	-0.15	-0.53
Exchange rate as in control solution		
GNP (millions of 1971$)	3,321.3	10,564.5
Consumption (millions of 1971$)	593.5	2,601.3
Investment (millions of 1971$)	852.7	3,102.0
Exports (millions of 1971$)	1,129.9	4,168.9
Imports (millions of 1971$)	-554.5	-571.2
Interest rate (%)	-1.18	-2.35
Unemployment rate (%)	-0.14	-1.37
GNP price deflator (1971 = 1.00)	-0.13	-0.39

NOTE: See note to Table 1.

The latter assumption has been adopted in this simulation, which can therefore hardly be accused of understating the power of incentives!

Once again, the impact of the policy is analysed under the assumptions of both a floating dollar and a fixed dollar. In both cases, the inflationary pressures on the economy are smaller than they were in the earlier analysis, since, by assumption, the rate of growth of productivity is assumed to increase. This reduction in inflation will in itself stimulate foreign trade. In the flexible exchange-rate case, the lower prices (relative to the control solution) will actually result in an appreciation of the Canadian dollar. When the exchange rate is fixed (as in the control solution), exports will increase by even a larger amount. The unemployment rate also increases somewhat initially, indicating a substitution of capital for labour. However, as demand increases, the unemployment rate falls significantly. All of these results arise largely from the strong assumption that has been made concerning the associated increase in productivity: it is assumed in these simulations that by the end of the period analysed, average productivity in the

economy as a whole (defined as real GNP per person employed) will be approximately 4 per cent higher as a result of the new technology.

Table 11 sets out the industrial and provincial impact of a policy with these characteristics. As might be expected, the electrical products industry exhibits the largest increase. By the end of the period, output in this industry is roughly 20 per cent higher than it is in the control solution. Owing to the fact that relatively lower domestic prices result in increased exports, the output of both the motor-vehicle and the primary metal industries also increase (by over 10 per cent by 1990). On a provincial level, Quebec and Ontario exhibit the largest increases, since it is their industries that are affected most.

This experiment in fostering a high-technology industry is obviously *very* crude, and the caveats outlined above must be borne in mind when analysing the results. While the *direction* of the results for such a policy seems plausible, neither the timing nor the magnitude of the industrial responses shown in these simulations are likely to be particularly realistic. The contribution of the analysis is its examination of the impact of this policy in a general framework that recognizes the interdependence of sectors of the economy and the different adjustment mechanisms provided by different assumptions about exchange-rate behaviour. What this simulation suggests most strongly is the critical importance of the impact of policy on productivity – not, unfortunately, a subject about which we know much, and one that no existing modelling process handles very well.[10]

The effect of a decline in the motor-vehicle industry

There has been considerable discussion recently about the future of the auto industry in Canada (and in the U.S. as well). As we noted earlier, the Auto Pact clearly helped the auto industry in Canada grow rapidly in the late 1960s and early 1970s. In recent years, however, the deficit on trade in auto parts has raised concern about the strength of the motor-vehicle industry in Canada. While the motor-vehicle industry is an important part of the manufacturing sector (especially in Ontario, where it accounts for some 14 per cent of manufacturing activity), the degree of labour intensity in the industry, the presence of a strong auto union, and the continued deficit in trade in motor vehicles may lead over time to a further decline in the auto industry in Canada, despite its apparent current revival.

Earlier studies indicated a variety of structural problems in the Canadian motor-vehicle industry, some of which were the result of a need for retooling. From 1978 until the recession of 1982, however, real investment in the motor-vehicle industry in Canada grew rapidly. As a

TABLE 11
Industrial and provincial impact of fostering high technology – exchange rate as in control solution (average annual and percentage changes from the control solution)

	1983-6		1987-90	
	Level	% change	Level	% change
Industrial output (millions of 1971$)				
Manufacturing	1,248.6	4.73	3,408.9	12.01
Electrical products	217.7	13.83	327.9	19.63
Motor vehicles	222.8	9.31	732.7	29.85
Primary metals	218.2	5.16	610.0	13.54
Services	1,405.9	2.07	4,564.1	5.82
Total goods	1,594.4	3.53	4,660.2	9.57
Provincial impact				
GDP (millions of 1971$)				
Quebec	684.3	2.40	2,008.3	6.40
Ontario	1,445.8	2.91	4,299.2	7.81
Alberta	279.9	1.77	934.0	5.19
British Columbia	333.2	2.04	1,087.2	5.81
Employment (thousands)				
Quebec	5.7	0.20	60.3	2.10
Ontario	26.6	0.60	150.6	3.22
Alberta	-2.9	-0.26	17.5	1.36
British Columbia	-0.6	-0.06	25.9	1.64

NOTE: See note to Table 1.

recent study by Perry (1982) indicates, there were several reasons for this investment growth, including large subsidies from the federal and Ontario governments. But in spite of this new investment, the industry continued to decline. Perry argues that policymakers can choose one of two basic routes in dealing with this decline:

> – actively manage the decline of this industry with a view of facilitating the shift of resources into more efficient sectors ... ;
> – resist the decline ... in an attempt to preserve employment for as long as possible. (1982, 105)

The simulation performed here considers the effects of permitting the decline of the motor-vehicle industry in Canada. The decline is modelled by reducing the real exports of autos and increasing the real imports of autos. This result would not easily be achieved under the Auto Pact in its current form, but it may provide an indication of the scope of the adjustment policies required if the industry declines in the future.

Specifically, exports of motor vehicles and parts are reduced by some $1,300 million (in 1971 dollars), while imports are increased by approximately 70 per cent of this amount.

Table 12 sets out the results of this simulation, using two different policy levers. Part A of Table 12 assumes a flexible exchange rate, while Part B assumes that the exchange rate is fixed through the use of monetary policy, as it is in the control solution. The latter case results in the larger real effects. As in the other simulations, the 'true' effect may lie somewhere between these two possible scenarios, depending upon the policy followed by the Bank of Canada.

As Part A of the table shows, there is almost *no* effect on real GNP as a result of presumed decline in the auto industry, owing to the depreciation of the Canadian dollar (in this case by almost 4 cents against the U.S. dollar in the second half of the simulation period) caused by the reduction in exports and increase in imports of autos. This depreciation results in an increase in exports of other goods and thus boosts real output. However, the net result of this policy is a significant reduction in the growth of the auto industry, an outcome that largely affects Ontario. Even so, Ontario's real provincial product falls by less than 1 per cent relative to the control solution by 1990, although motor-vehicle output is 11 per cent lower by the end of the period. With the depreciation of the Canadian dollar, other industries in Ontario increase production to meet the increased foreign demand, thus offsetting much of this decline.

The second part of Table 12 sets out the impact on the economy of a decline in the motor-vehicle industry while the exchange rate is held fixed. In this case, the impact on both GNP and employment is much larger. The national unemployment rate rises by over 0.5 percentage points, while real GNP is over 2 per cent lower than it is in the control solution. As in the previous simulations under this policy rule, this result largely reflects the effect of a higher interest rate on investment expenditures. In this case, Ontario's real output falls by some 2 per cent relative to the control solution – as a result of both the direct impact of the decline in the auto industry and the final demand lost through investment. In this simulation, almost all industries are affected negatively – although to varying degrees.

These simulations highlight again the great importance of macroeconomic policy in determining the overall impact of economic decline in any particular industry. While many have argued that a decline in the motor-vehicle industry would cause major problems in the Canadian economy, these simulations suggest, for example, that the effect on the economy of such a decline would be much smaller if the exchange rate were left to float freely rather than maintained at a given

TABLE 12
Effect of a decline in the motor-vehicle industry (average annual and percentage changes from the control solution)

	1983-6		1987-90	
	Level	% change	Level	% change
A *Flexible exchange rate*				
National				
GNP (millions of 1971$)	-13	-0.01	-122	-0.08
Consumption (millions of 1971$)	-28	-0.03	-46	-0.05
Investment (millions of 1971$)	11	0.05	-80	-0.27
Exports (millions of 1971$)	-80	-0.22	-220	-0.53
Imports (millions of 1971$)	-79	-0.20	-231	-0.53
Interest rate (%)	0.04	NA	0.16	NA
Unemployment rate (%)	-0.04	NA	0.06	NA
Exchange rate	0.01	NA	0.04	NA
GNP price deflator (1971 = 1.00)	0.01	0.20	0.04	0.82
Industrial				
Manufacturing output (millions of 1971$)	-34.0	-0.21	-161.9	-0.57
Textiles and clothing	-6.3	-0.33	-15.5	-0.77
Paper, printing, and allied products	8.1	0.22	29.4	0.74
Motor vehicles	-85.8	-3.64	-263.5	-10.74
Services output	44.5	0.07	74.5	0.10
Goods output	-40.8	-0.09	-124.6	-0.25
Provincial				
GDP (millions of 1971$)				
Quebec	-53.6	-0.11	-206.4	-0.37
Ontario	16.0	0.05	43.2	0.14
Alberta	10.0	0.06	24.0	0.14
British Columbia	11.6	0.07	31.4	0.17
B *Exchange rate as in control solution*				
National				
GNP (millions of 1971$)	-597	-0.42	-1971	-1.24
Consumption (millions of 1971$)	-155	-0.12	-700	-0.68
Investment (millions of 1971$)	-218	-0.83	-686	-2.35
Exports (millions of 1971$)	-233	-0.64	-686	-1.68
Imports (millions of 1971$)	-58	-0.14	-171	-0.39
Interest rate (%)	0.26	NA	0.45	NA
Unemployment rate (%)	0.14	NA	0.50	NA
GNP price deflator (1971 = 1.00)	0.00	0.00	-0.02	-0.37

TABLE 12 (continued)

	1983-6		1987-90	
	Level	% change	Level	% change
Industrial				
Manufacturing output (millions of 1971$)	-243.1	-0.92	-718.1	-2.54
Textiles and clothing	-14.8	-0.79	-47.5	-2.35
Primary metals and fabrication	-34.6	-0.82	-97.7	-2.18
Motor vehicles	-125.7	-5.32	-375.2	-15.32
Chemical, rubber, and petroleum products	-18.9	-0.58	-60.4	-1.68
Nonmetallic mineral products	-7.6	-0.77	-22.6	-2.15
Services output	-226.6	-0.33	-763.0	-0.98
Goods output	-315.1	-0.69	-935.1	-1.93
Provincial				
GDP (millions of 1971$)				
Quebec	-289.3	-0.58	-924.8	-1.68
Ontario	-101.2	-0.35	-309.2	-0.99
Alberta	-48.0	-0.31	-150.3	-0.84
British Columbia	-52.5	-0.32	-162.6	-0.88

NOTE: See note to Table 1.
NA – Not appropriate.

level. This is not to suggest that adjustment assistance would not be needed: indeed, it would certainly be warranted, in the form of retraining and other assistance, for at least some workers (Saunders 1984). Yet the analysis does indicate that the need for adjustment assistance may not be nearly as great as has sometimes been argued. Of course, change will still be costly for those directly involved in the declining industry, but the offsetting growth elsewhere in the economy should make it feasible to spread the burden of these adjustment costs more widely and fairly.

5
Summary and conclusions

This paper has presented some evidence on the effects of several kinds of policies that may be used to alter the industrial structure of Canada. A macroeconometric model was used to simulate not only the effects of both specific and general industrial policies, but also the effects on industrial structure of some broader macroeconomic and structural policies.

Despite the many limitations of such simulations noted earlier, a number of points emerge in this analysis that deserve special emphasis. First, the effects of any particular industrial policy may vary substantially with the macroeconomic environment in which the policy is enacted. For instance, the simulation depicting a decline in the motor-vehicle industry demonstrated that the effects on national (or Ontario) economic performance of allowing the exchange rate to float freely would not be nearly as devastating as might at first be thought. In all of the simulations reported, an attempt has been made to consider policy responses that yield dramatic results. In reality, however, as recent experience suggests, the Canadian dollar is neither freely floating nor fixed: instead, if a rapid change is likely to occur, the central bank generally steps in to moderate the change. The simulations reported here are intended to indicate how the macroeconomic environment (the policy response of the dollar, for example) can dramatically affect the outcome of a particular industrial policy. At the very least, these results suggest that if specific industrial policies are to be undertaken they must be accompanied by appropriate macroeconomic policy.

Second, as was demonstrated by the exchange-rate simulation, even the most general macroeconomic policies may have significant industrial and regional effects. The other side of this coin is that the effect of the general business cycle on particular industries should be carefully considered before a decision is made that structural policies are needed to aid certain industries or sectors of the economy. In other words, the

impact of 'top-down' macroeconomic policies on industries and regions should be taken into account before 'bottom-up' microeconomic policies are put in place. More briefly still, as Schwartz and Choate (1980) argue, there should be more explicit co-ordination between microeconomic and macroeconomic policies.

Third, even the limited simulations of particular industrial policies that were possible indicated that there is still a great deal to be discovered about the interactions between general and industry-specific policies. The impact on the economy of specific policies may vary substantially, depending on what general policies are being undertaken. This would suggest that there may be an optimal mix of specific and general policies. Given the wide range of goals that a policymaker wants to achieve – from macroeconomic goals (e.g., low inflation, low unemployment) to microeconomic goals (e.g., fostering high technology, aiding the Maritime Provinces) – determination of the appropriate mix of general and specific policies is important. Unfortunately, the econometric models now available are not particularly well suited to considering the impact of specific industrial developments on the economy as a whole. In the case of the FOCUS/PRISM system used here, for example, the industrial/provincial model is a satellite model with no feedbacks from the industrial/regional disaggregation to aggregate behaviour. Given the present structure of these models, not much information can be obtained about the policy mix issue.

Despite this important limitation, in assessing the effects of policies that alter the industrial structure of Canada – whether these policies be general or very specific in nature – the simulations presented in this study do provide strong evidence of the importance of considering these effects in the framework of a general model rather than simply ignoring the macroeconomic environment, as has too often been done in Canadian discussion of the impact of industrial policies.

Notes

1 For more discussion of these barriers, see Milne (1983) and the analysis of the macroeconomic impact of the erection of nontariff barriers in Dungan and Milne (1983).

2 See Kotowitz (1985) for a discussion of this debate with respect to R&D.

3 This section is based on Jump and Dungan (1978) and Dungan (1981).

4 For a discussion of this approach in the regional context, see Schwartz (1982).

5 Of course, the degree of refinement attainable is limited to the industrial breakdown provided by the input-output table.

6 For a discussion of industrial policy in Japan, see Allen (1979) and Trezise (1982). West Germany's policies are surveyed in Merden (1982) and Owen-Smith (1979).

7 It should of course be recalled that these results assume that industries operate throughout the projection period with the same technology implied by the 1977 input-output table.

8 Increased productivity is in effect imposed in the FOCUS model by adjusting the productivity term in the equation used to compute the aggregate price for the economy. The assumed increase in productivity in the sectors using the *products* of the high-technology industry is broadly consistent with the studies reviewed in Kotowitz (1985).

9 As in the case of the investment tax credit, this is assumed to be a pure fiscal policy, resulting in a deterioration of the federal budget position.

10 See Denny and Fuss (1982) on productivity analysis and Helliwell (1983) for a different 'modelling' approach to productivity.

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